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of an interesting subject, and, like his earlier work, is illustrated by process reproductions of well-chosen photographs.

An ingenious door device for herbarium cases is described and figured in the report of the Director of the Field Columbian Museum of 1899–1900, recently issued as *Publication 52* of that institution.

The vexed question of the preservation of herbarium specimens by impregnation with poisons is rediscussed by Paiche in No. 3 of the current volume of the *Bulletin de l'Herbier Boissier.*

A biographic sketch of J. G. Agardh, by Magnus, is published in the *Naturwissenschaftliche Rundschau* for February 28.

A biographic sketch, with portrait, of the late Thomas A. Williams appears in *The Asa Gray Bulletin* for January, a journal of which Professor Williams was editor-in-chief at the time of his death.

Portraits of Thomas Meehan and Frederick Law Olmsted are published in *The American Florist* of March 23.

PALEOBOTANY.

The Jurassic Flora of Great Britain.[1]—The present contribution from the pen of Mr. Seward, which will find a warm welcome from paleobotanists generally, deals with the fossil plants from the Inferior Oölite of the Yorkshire coast and is presented in the form of an illustrated catalogue, which is evidently designed to serve as the basis of further systematic treatment of the species, as well as of a more ample discussion of stratigraphical relations. In the present volume, therefore, the author attempts little beyond an endeavor to record the location of the various types found; to discuss the different species historically; to illustrate each type by excellent drawings; to institute a preliminary comparison with the Jurassic floras of other countries, and to simplify the nomenclature. Generic and specific diagnoses are presented only in special cases.

The material utilized is primarily that contained in the British Museum and represented by six different collections, of which the specimens derived from the collection of the late William Bean of Scarborough, by purchase in 1859, constitute the most important elements. Another section of the Bean collection is deposited in the Museum of the Yorkshire Philosophical Society at York. The study of the material contained in these two museums has been supplemented by an examination of specimens in the Museums of Cambridge, Whitby, Scarborough, Oxford, Manchester, Newcastle, and Leeds, all of which are rich in collections of Yorkshire coast plants, and also of specimens in the collections at Paris, Lund, Stockholm, and other continental museums.

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[1] Seward, A. C. A Catalogue of the Mesozoic Plants in the Department of Geology, British Museum, Part III. The Jurassic Flora. London, 1900. Large 8vo. 341 pp., 21 plates.

The author's experience shows that the identification of type specimens which have become so widely distributed is a very difficult and often fruitless task, and his appeal for some definite system whereby such important material may be centralized and the types thereby preserved and made accessible, is one which must meet with strong sympathy from paleobotanists elsewhere.

The Cliff sections of Jurassic plant-bearing strata exposed along the Yorkshire coast from Whitby to a few miles south of Scarborough have afforded unusually rich data bearing upon our knowledge of Mesozoic vegetation, and Mr. Seward points out that the flora of this particular district is the richest among Mesozoic floras from British localities, both as regards the number of species and the abundance of material, and that it is scarcely surpassed by any assemblage of fossil plants from extra-British regions. The large amount of this material which has found its way into various European collections has resulted at various times in partial descriptions by Brongniart, Sternberg, and other continental paleobotanists. As long ago as 1828, Brongniart described twenty-two species of these plants, and during the period from 1831–37, Lindley and Hutton published forty-seven species. In 1874 Professor Phillips recorded ninety-five species in the last edition of his work. At different times various other authors have published minor lists, but the most important contribution from a numerical point of view was that of Fox-Strangways and Barrows, who recorded one hundred and seven species in Vol. II (Yorkshire) of the *Geological Survey Memoirs.* But up to the present date no systematic attempt has been made to deal with the flora exhaustively and ascertain its geographical distribution ; to compare it with older and younger floras, as also with recent species ; to determine the conditions under which the plants grew, and to recognize the most characteristic species with a view to their employment as indices of geological age. This task has now been assumed by Mr. Seward after the lapse of forty-two years, and in the catalogue before us we are presented with the initial results of his studies.

An examination of extra-British Jurassic plants presents in convenient form an approximate comparison of the Jurassic floras of the various countries of the world, and the probable identity of such species with, or their resemblance to, British types is made clear by the use of a tabular presentation.

The present studies offered some conclusions of interest, of which the following may be noted:

The Jurassic flora shows a great preponderance of ferns and cycads, with relatively few conifers, and a remarkable paucity of the Equisetales and Bryophyta, in all of which features it exhibits a striking similarity to the flora of the Wealden as described in previous British museum catalogues, while they appear to be directly connected by a few apparently identical species, such as *Matonidium gœpperti*, *Ruffordia gœpperti*, and *Ginkgo digitata*, which are common to both floras.

Among the Equisetales the generally large size of the stems indicates a much nearer approach to the arborescent forms of the Triassic and Palæozoic than to the diminutive representatives found among the modern horsetails. In *Equisetites columnaris*, which is one of the most common and characteristic plants of the Yorkshire flora, the author finds evidence that the small seams of coal which occur in strata of the Estuarine series, were formed in part, if not entirely, from the remains of the Equisetaceous plants which flourished in the Jurassic swamps.

Ferns of the Sagenopteris and Cladophlebis types, while often abundant, afford little satisfactory evidence of relationship, which is much more clearly indicated by the Matonineæ and Dipteridinæ, which were abundantly represented in Jurassic time, and also by the Osmundaceæ and Cyatheaceæ. The Schizeaceæ were also represented by a few doubtful examples, but the Gleicheniaceæ and the Marattiaceæ are as yet unknown elements in the Yorkshire coast flora. From the types so far recognized it appears that this flora finds its closest resemblances among existing species in the Southern Hemisphere, where the Malayan *Matonia pectinata*, the Asiatic *Dipteris*, *Dicksonia arborescens* of St. Helena, and *Todea barbara* of New Zealand and Australia offer the closest parallelisms.

Among the Ginkgoales, both Ginkgo and Baiera are characteristic of the Jurassic floras, and they appear to have extended back through the Triassic into the Permian. Their extreme northern range points with considerable force to a vigorous development of the Ginkgoales during later Mesozoic time.

The Jurassic in Great Britain, as in North America, was essentially the Age of the Cycads, a fact strongly emphasized by the Yorkshire flora where Williamsonia, Otozomites, and Nilssonia formed conspicuous elements.

As already pointed out, the Coniferæ are much less abundant in this flora than either the ferns or the cycads, but the evidence so far obtained makes it impossible to determine how far this is to be accepted as an expression of their actual relation to the original flora, since local conditions may have operated to exclude a large proportion of such plants from preservation as fossils. The nearest existing types appear to be represented chiefly by various species of Araucaria, although Podocarpus is also suggested by *Nageiopsis anglica.* The Abietineæ, which assume an important position in the Wealden and Lower Cretaceous floras, have no well-defined representatives in the Yorkshire flora.

So far as any general conclusions are justifiable upon the basis of the present studies, it would seem probable that in seeking comparisons between the Jurassic flora of the Yorkshire coast and the vegetation of the present time, we must turn to the southern tropics. In the general character of the vegetation, therefore, as also in the luxuriant growth of Equisetums and ferns, we observe evidence not only of a moist climate, but also indications that the climate of England during Jurassic time must have been considerably more tropical than at present.

D. P. Penhallow.